

## Area Seminar

Title Spectral statistics of interacting trapped bosons

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Area Theoretical Physics

Venue Room No. 469

Abstract It is very much interesting to study the energy-level statistics of interacting trapped bosons which are spatially inhomogeneous. We study the zero-temperature many-bosons system interacting through the van der Waals potential and confined in a 3D harmonic potential. The system is a kind of complex system where the two energy scales co-exist. One is the external trap and another is the interatomic interaction. In case of repulsive interaction the lower levels are correlated manifesting level-repulsion. For non-interacting bosons exact degeneracy exists and the energy-level statistics shows picket-fence type nature. But for a few bosonic system the small interaction acts like perturbation and consequently a large number of quasi-degenerate states occur showing Shnirelman peak in  $P(s)$  distribution. For large number of bosons the low-lying levels are of collective nature and strongly affected by the interatomic interaction whereas the high-lying levels show single particle excitations. The corresponding level fluctuation shows a transition from close to Wigner to Poisson with increase in energy levels implying that it does not obey the Bohigas universal conjecture. Thus interacting trapped bosons may be a generic example to show that  $1/f$  noise is ubiquitous in nature and  $\gamma$  not only measures the chaoticity of the system but also measures the degree of integrability for complex systems.